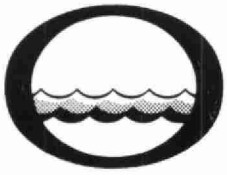
1970 OPERATING SUMMARY

SAULT STE. MARIE

water pollution control plant

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations



Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 195
Ontario

Once again we have the privilege of submitting to you our latest detailed report on financial progress and technical activity at your water pollution control plant.

The statistical information contained in this annual operating summary will undoubtedly be a useful barometer of efficiency. Of particular interest will be the comments and recommendations of the regional operations engineer, who was intimately connected with day-to-day operation throughout 1970.

Together with the extensive cost data provided, this information should assist greatly in your general understanding of the problems met and dealt with, and in furnishing a yardstick for possible future expansion.

D. S. Caverly,
General Manager.

D. A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

CONTENTS

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DIVISION OF PLANT OPERATIONS

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Assistant Director
C. W. Perry

Regional Supervisor
A. C. Beattie

Operations Engineer
A. Clark

135 St. Clair Avenue West
Toronto 195

SAULT STE. MARIE
water pollution control plant

operated for

THE CITY OF SAULT STE. MARIE

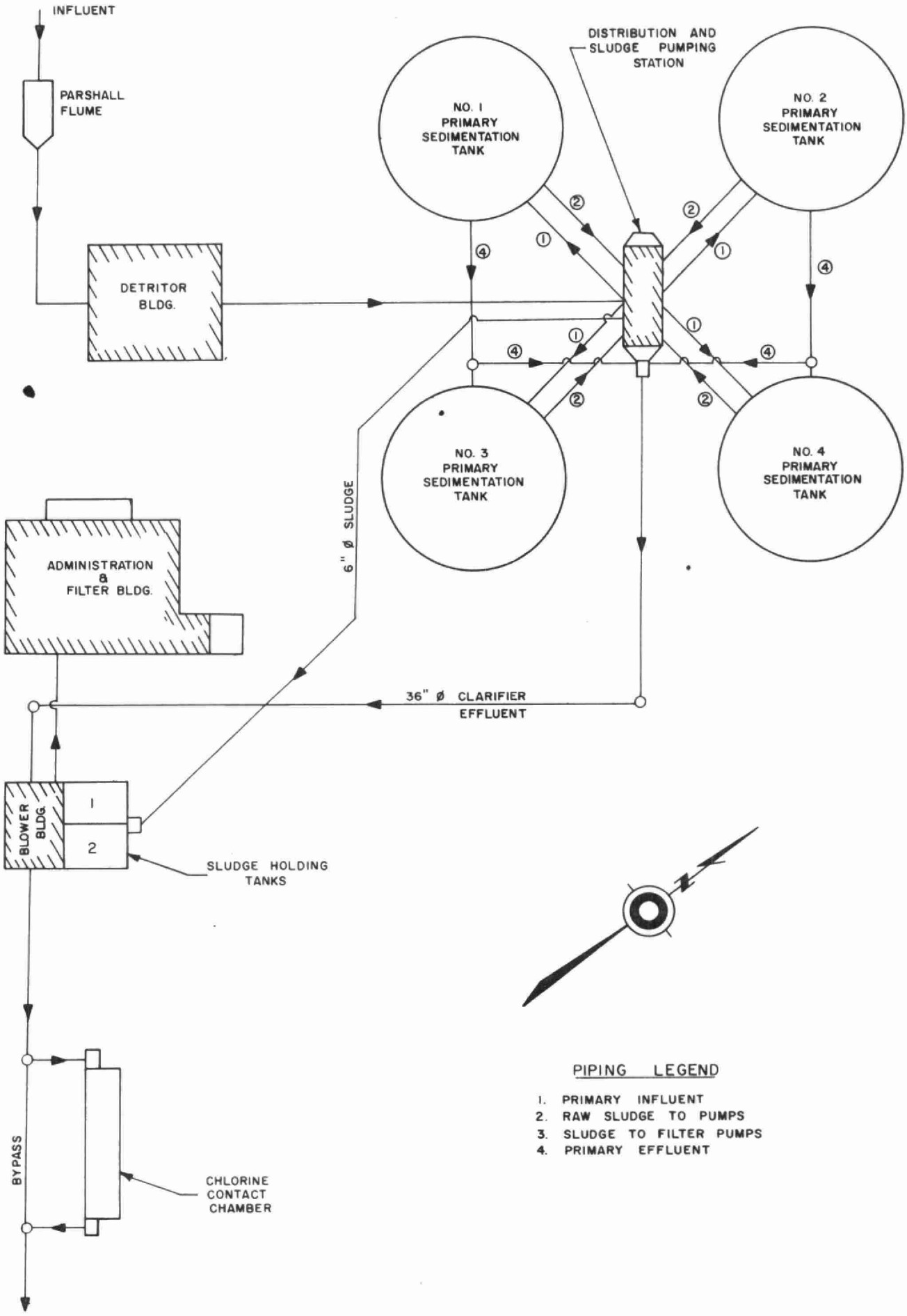
by the

ONTARIO WATER RESOURCES COMMISSION

1970 ANNUAL OPERATING SUMMARY

SAULT STE. MARIE

WATER POLLUTION CONTROL PLANT
FLOW DIAGRAM



DESIGN DATA

PROJECT NO.	2-0020-58	TREATMENT	Primary
DESIGN FLOW	8.0 mgd	DESIGN POPULATION	72,500
BOD - Raw Sewage	250 mg/l	SS - Raw Sewage	200 mg/l
- Removal	35%	- Removal	60%

PRIMARY TREATMENT

Comminution

Type: Barminutor
Size: Two Model C (36")

Grit Removal

Type: Dorr detritor
Size: Two 18' x 18' x 1'3" (6,240 gal)
Retention: 1.13 min
Flow Velocity: 0.209 fps

Primary Sedimentation

Type: Dorr
Size: Four 70' dia x 8' swd (900,000 gal)
Retention: 2.3 hr
Loading: Surface, 520 gal/ft^2/day
Weir, 13,000 gal/ft/day

CHLORINATION

Type: W & T
Size: One 800 lb/day

Chlorine Contact Chamber

Size: One 60' x 20' x 12' (90,000 gal)
Retention: 16.2 min

OUTFALL

- to St. Mary's River

SLUDGE HANDLING

Holding Tank - Aerated

Size: Two 24' x 15' x 11½' (8,280 cu ft or 51,600 gal)
Air Supply: One Sutorbilt

Vacuum Filter

Type: Komline-Sanderson
Size: Two 200 sq ft

PUMPING STATIONS

Pim Street Pumping Station

Type: Worthington
Size: One 10,000 gpm @ 50' tdh (diesel)
Two 6,300 gpm @ 40' tdh (electric)

Clark Creek Pumping Station

Type: Worthington
Size: One 12320 gpm (electric)
One 13000 gpm (diesel)
Two 7000 gpm (electric)
One diesel generator

Wiita Pumping Station (Temporary)

Type: Smart-Turner
Size: 2400 gpm @ 30' tdh (electrical)

'70 REVIEW

GENERAL

During the year, a report was submitted by the Consulting Engineers. The report recommended a 50% enlargement of the plant.

An investigation was made into odours emitting from the Clark Creek pumping station. A report on the results and remedial action is expected shortly.

The Department of Health required that year round chlorination be implemented. This was done in agreement with the Department of Health, City Officials and the Ontario Water Resources Commission.

PLANT FLOWS and CHLORINATION

Year round chlorination was instituted in 1970. Due to this additional use of chlorine, there was an expected increase of the plant's chemical costs.

An average of 5.4 mg/l of chlorine was applied to the effluent to maintain a residual of 0.5 mg/l after 15 minutes contact.

A total recorded flow of 3107 million gallons was treated in 1970. The average daily flow was 8.5 million gallons while the maximum and minimum daily flows were 26.8 million gallons and 2.8 million gallons respectively.

PLANT EFFICIENCY

The BOD removal averaged 32% over the year while the suspended solids removal averaged 56% for the same time. High flows and low influent BOD's resulted in the low percentage removal of BOD.

VACUUM FILTRATION

A 24% total solids concentration of filtered sludge was obtained without the use of conditioning chemicals. The filter yield of 9.2 pounds of dry solids per square foot per hour of operation was exceptionally good.

CONCLUSIONS

The treatment works should be enlarged as soon as possible.

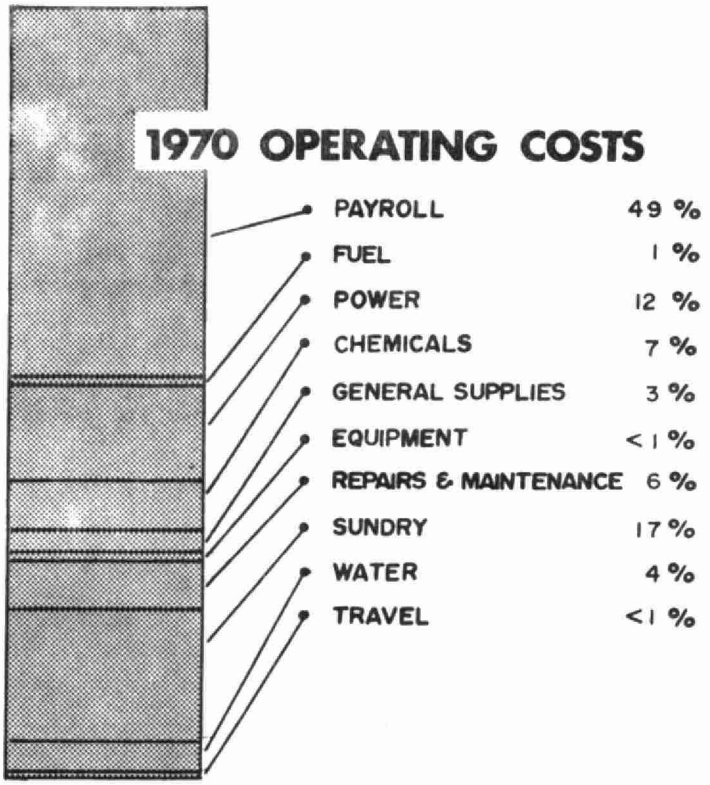
When the report on the Clark Creek pumping station is available, its recommendations should be implemented.

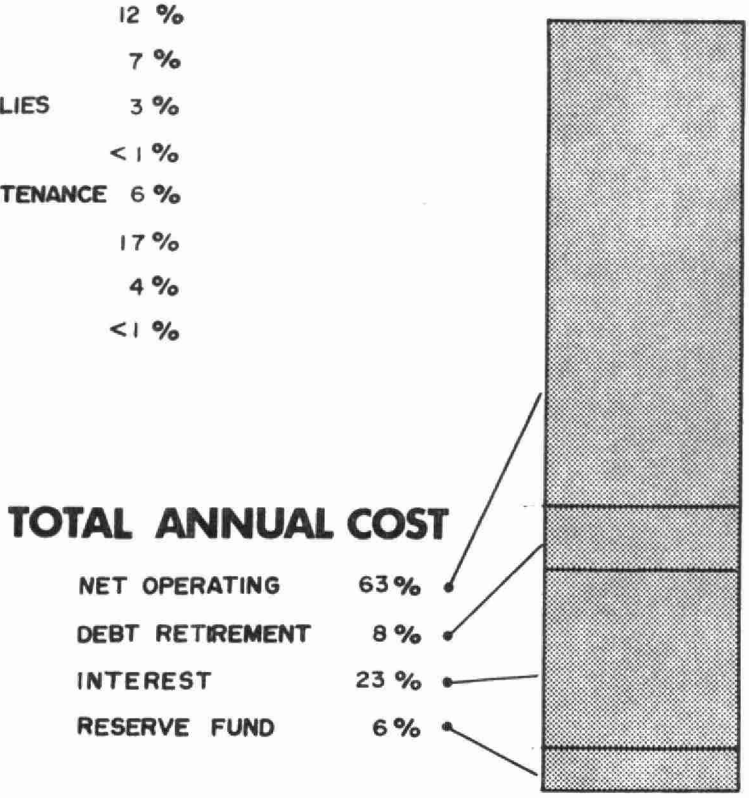
PROJECT COSTS

NET CAPITAL COST (Final)	$3,244,149.35
DEDUCT - Portion financed by CMHC/MDLB (Final)	2,148,472.61
Long Term Debt to OWRC	$1,095,676.74
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	$ 260,775.93
Net Operating	$ 166,827.59
Debt Retirement	22,111.00
Reserve	16,299.24
Interest Charged	61,386.62
TOTAL	$ 266,624.45

RESERVE ACCOUNT

Balance @ January 1, 1970	$ 138,732.01
Deposited by Municipality	16,299.24
Interest Earned	9,261.21
	$ 164,292.46
Less Expenditures	4,734.30
Balance @ December 31, 1970	$ 159,558.16





Yearly Operating Costs

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1966	2668.91	$126,102.15	$47.25	11 cents
1967	2796.57	135,741.58	48.54	17 cents
1968	3196.10	136,641.46	42.75	14 cents
1969	3162.70	146,194.04	46.22	11 cents
1970	3107.00	162,677.59	52.30	17 cents

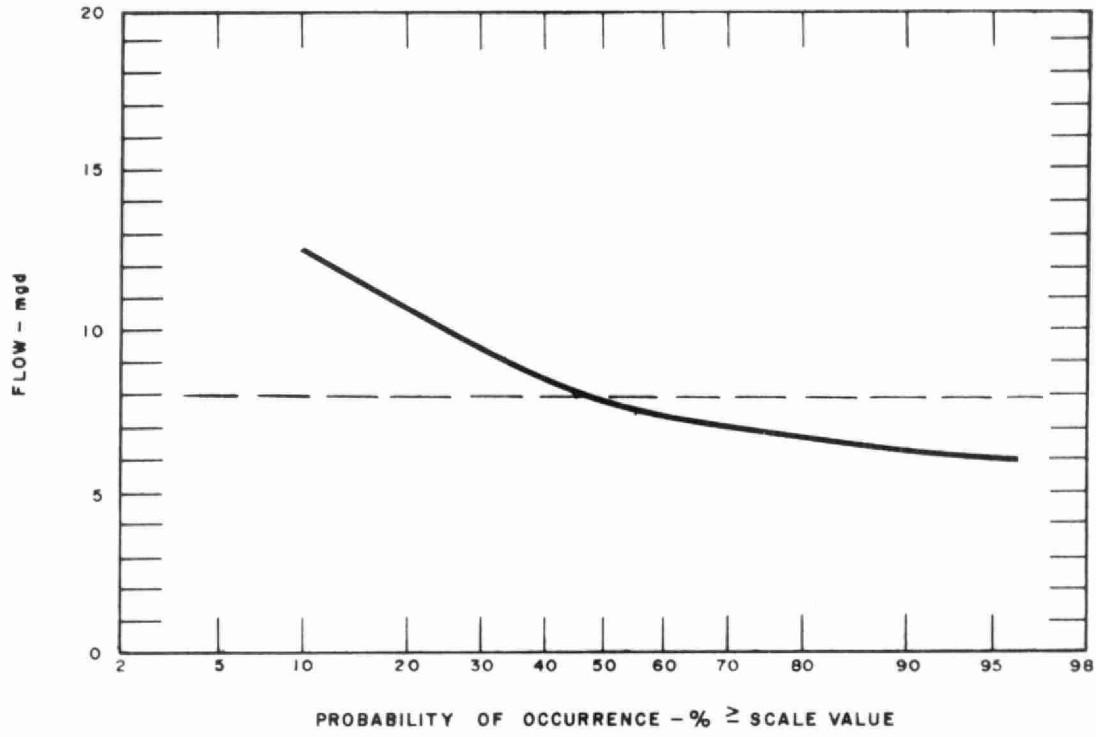
MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY *	WATER	TRAVEL
JAN	10201.49	8474.69	-	169.53	-	-	192.64	-	25.11	1040.16	210.16	89.20
FEB	11646.47	5678.44	-	251.04	3454.03	-	215.39	-	470.54	1141.93	332.12	102.98
MAR	8789.20	5586.20	-	353.79	1089.74	-	608.77	-	139.73	827.96	182.01	-
APR	10070.28	5867.59	-	274.71	2222.21	-	233.87	-	82.79	1106.57	196.16	86.38
MAY	13208.01	6743.44	-	151.05	2570.36	1600.20	373.96	-	-	1284.78	372.22	112.00
JUNE	7232.21	6119.81	-	-	78.03	-	276.05	-	153.08	255.14	330.26	19.84
JULY	26179.91	5992.18	617.26	143.45	676.94	-	363.96	227.00	3219.95	14464.99	378.38	95.80
AUG	15358.79	9012.16	702.19	-	2782.28	-	294.59	150.30	900.14	1113.65	403.48	-
SEPT	10794.09	6104.93	75.97	-	728.86	-	183.37	-	24.64	3059.94	535.02	81.36
OCT	13775.36	6023.92	-	121.30	3053.92	28.69	990.28	-	1384.17	1281.00	723.88	168.20
NOV	19371.98	6559.91	-	-	-	7542.94	423.36	-	3053.92	1237.35	446.50	108.00
DEC	16049.80	6049.21	-	683.01	3361.43	2197.65	507.44	189.35	320.43	855.26	1675.66	210.36
TOTAL	162677.59	78212.48	1395.42	2147.88	20017.80	11369.48	4663.68	566.65	9774.50	27668.73	5786.85	1074.12

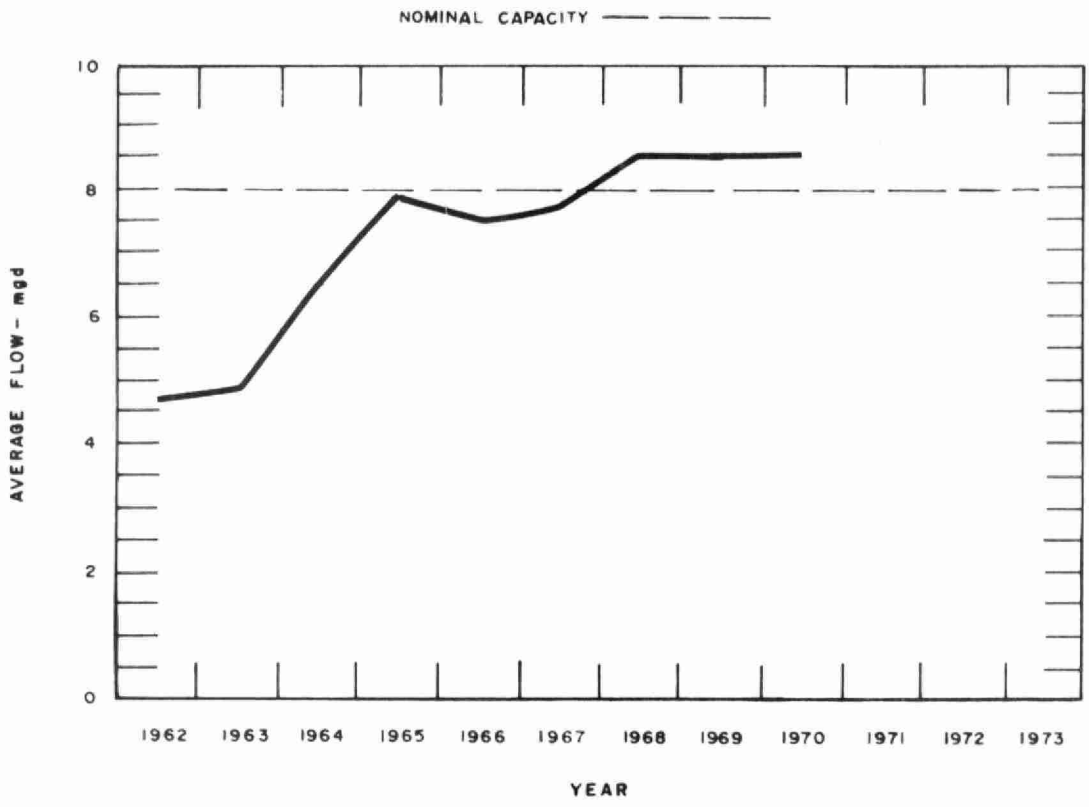
BRACKETS INDICATE CREDIT

* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE $11536.90

PROCESS DATA


20
15
10
5
0
FLOW - mgd
2
5
10
20
30
40
50
60
70
80
90
95
98
PROBABILITY OF OCCURRENCE - % ≥ SCALE VALUE

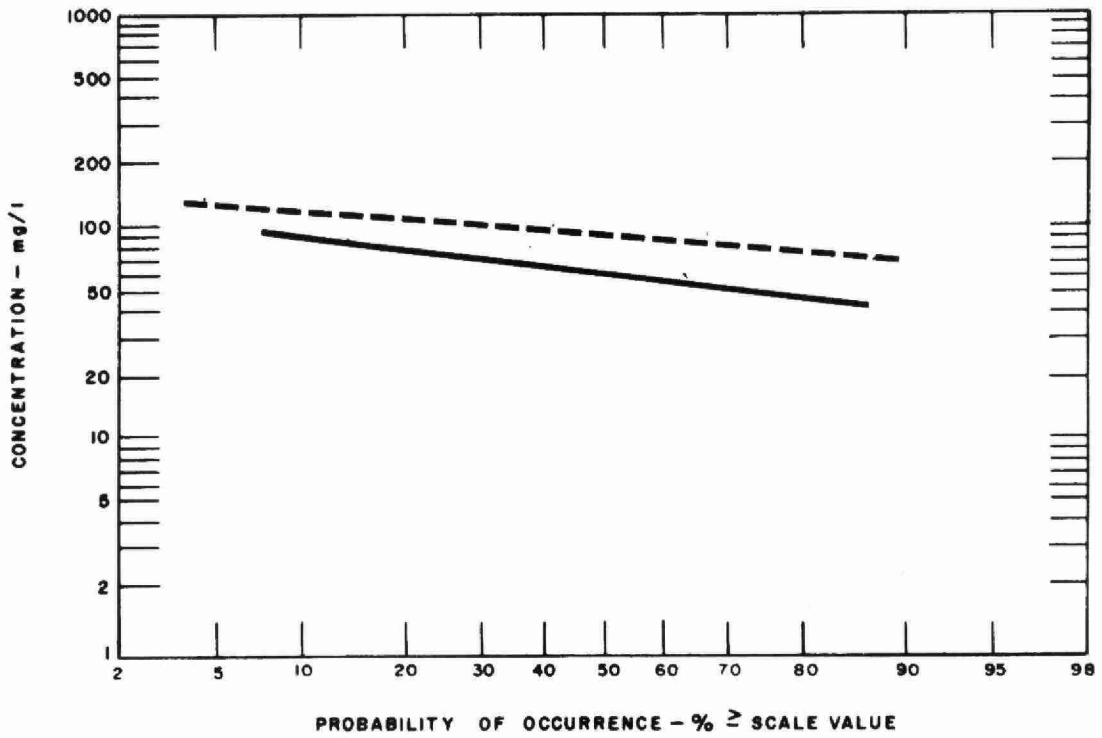
FLOWS


NOMINAL CAPACITY
10
8
6
4
2
0
AVERAGE FLOW - mgd
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
YEAR

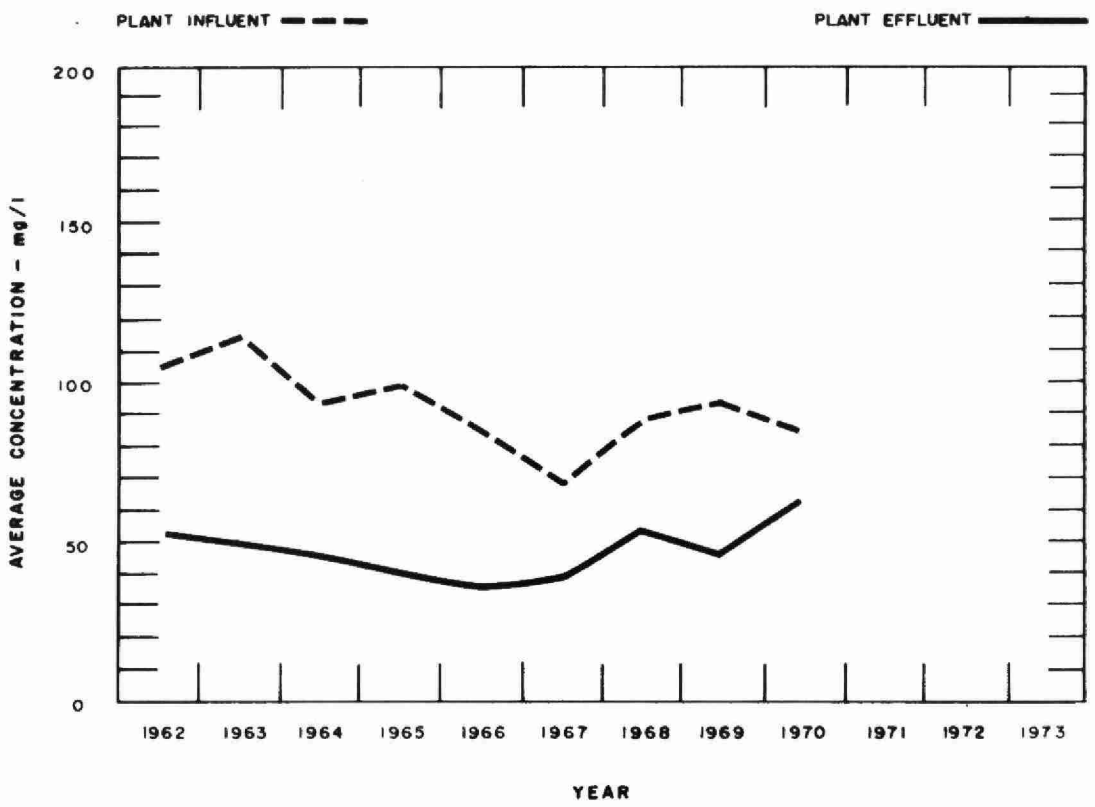
PLANT FLOWS and CHLORINATION

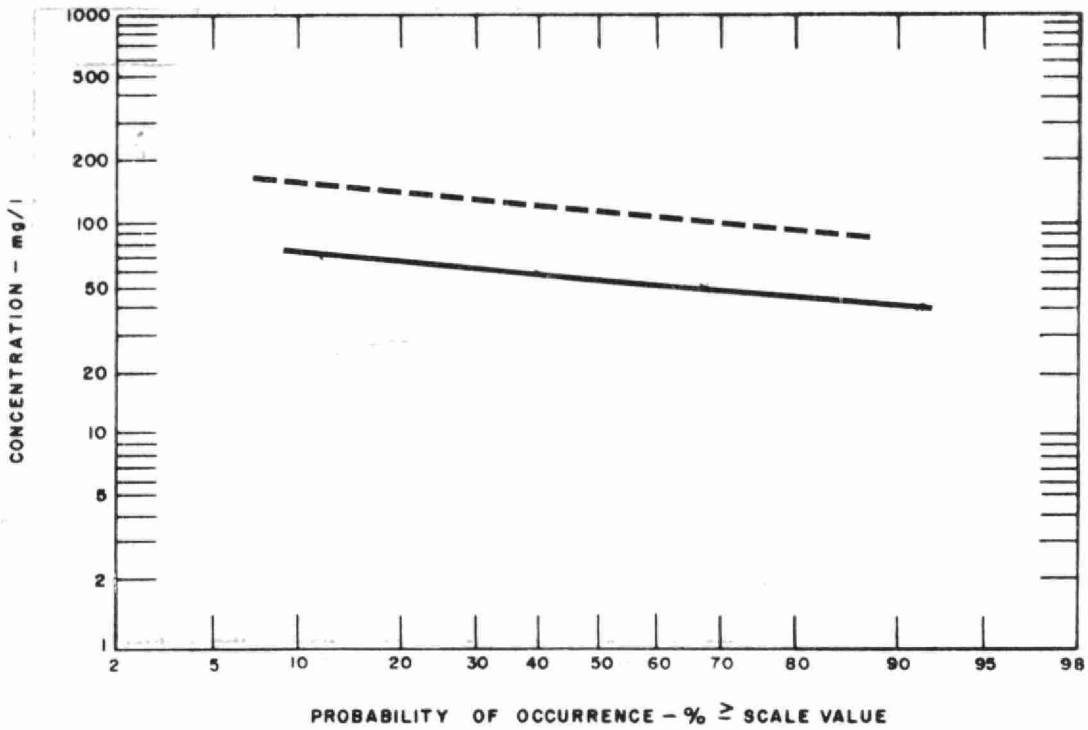
MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED 10^3 pounds	DOSAGE mg/l
JAN	199	6.4	6.8	6.1	0	-
FEB	175	6.2	7.2	5.6	0	-
MAR	307	9.9	14.6	7.2	0	-
APR	351	11.7	14.0	9.9	12.6 *	3.6
MAY	296	9.6	12.4	2.8	12.1	4.1
JUNE	271	9.0	26.8	6.0	12.3	4.5
JULY	220	7.1	10.7	5.7	16.3	7.4
AUG	201	6.5	9.0	5.4	19.6	9.7
SEPT	295	9.8	16.8	6.4	16.2	5.5
OCT	270	8.7	14.8	6.7	15.3	5.7
NOV	268	8.9	13.4	7.3	13.6	5.1
DEC	253	8.2	15.0	6.5	12.9	5.1
TOTAL	3107	-	-	-	130.9	-
AVERAGE	-	8.5	-	-	14.6	5.4

* April 1

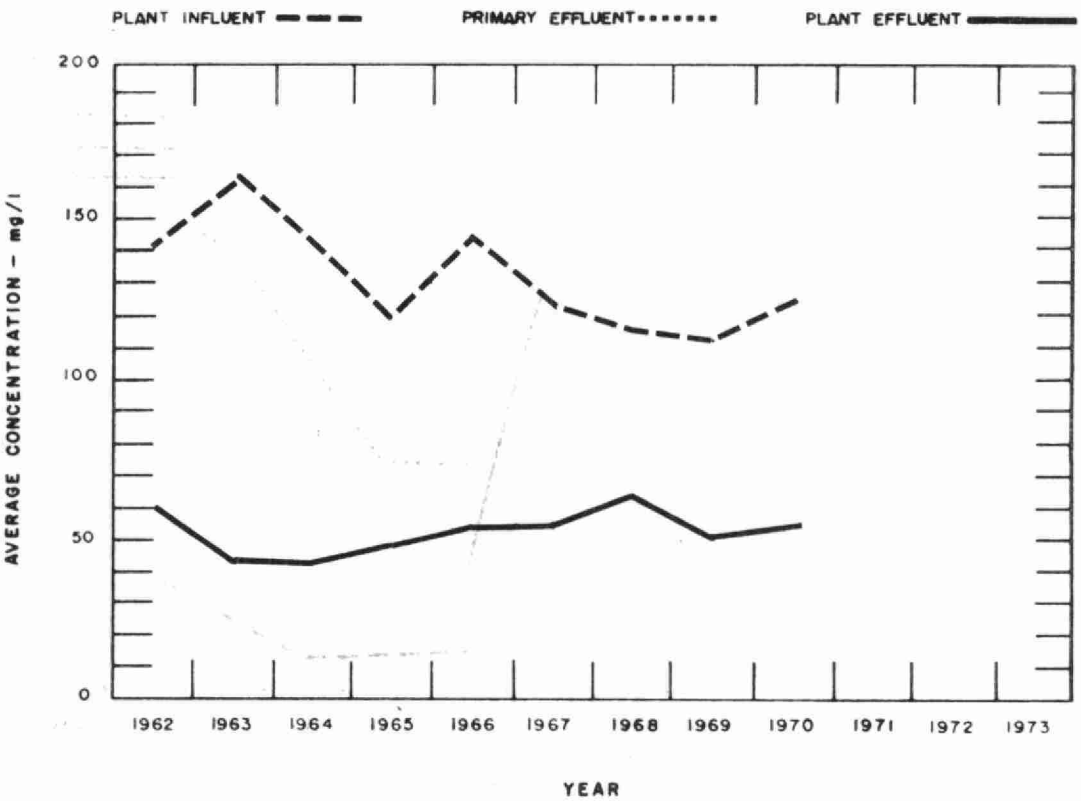


BIOCHEMICAL OXYGEN DEMAND





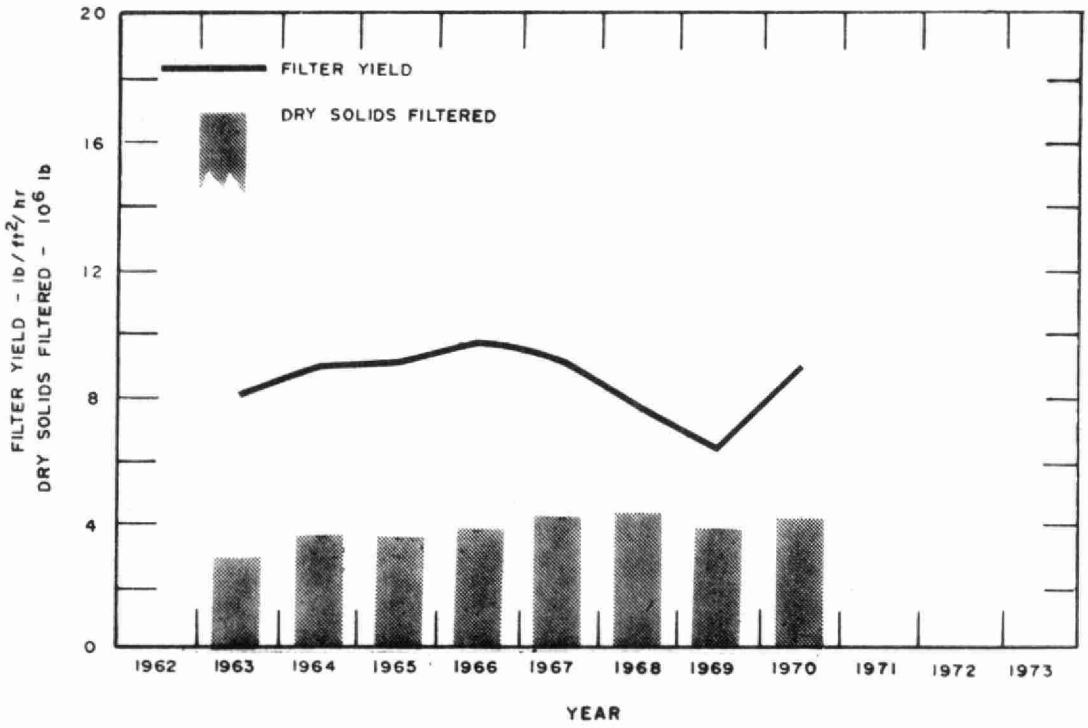
SUSPENDED SOLIDS



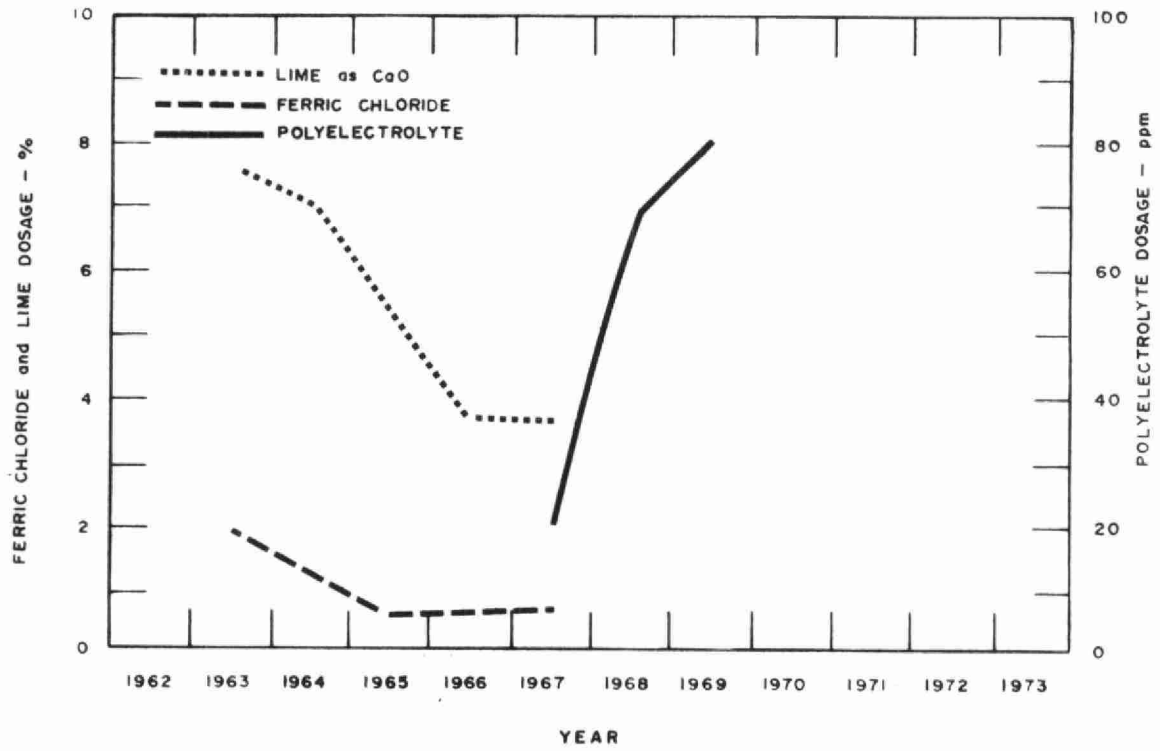
PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND						SUSPENDED SOLIDS						GRIT REMOVED
	INFLUENT		EFFLUENT		REDUCTION		INFLUENT		EFFLUENT		REDUCTION		
	n	mg/l	n	mg/l	%	10^3 pounds	n	mg/l	n	mg/l	%	10^3 pounds	cu ft
JAN	4	113	5	71	37	74	5	126	5	57	55	138	155
FEB	4	95	4	65	32	53	6	155	6	54	65	177	152
MAR	4	120	4	85	29	107	5	125	5	55	56	215	245
APR	6	89	6	63	29	91	6	137	6	53	61	295	168
MAY	5	95	5	64	32	92	6	112	6	58	48	160	158
JUNE	3	89	3	52	42	100	6	106	6	54	49	141	504
JULY	6	85	6	52	39	72	6	134	6	56	58	171	516
AUG	3	77	3	50	35	54	6	127	6	53	58	149	284
SEPT	2	91	5	70	23	62	5	109	6	54	50	163	296
OCT	3	95	4	56	41	105	4	110	4	50	54	162	590
NOV	5	97	5	63	35	91	5	128	5	60	53	182	188
DEC	6	79	6	69	25	58	6	129	6	56	56	185	108
TOTAL	51	-	56	-	-	959	66	-	67	-	-	2138	3364
AVERAGE	-	93	-	63	32	80	-	126	-	55	56	178	280

NOTE – n is the number of samples taken



VACUUM FILTRATION



VACUUM FILTRATION

MONTH	TOTAL FILTER USE hr	SLUDGE		CONDITIONING CHEMICALS						FILTER CAKE	FILTR.	YIELD
		TOTAL SOLIDS	DRY SOLIDS	CaO		$FeCl_3$		POLYMER				lb/hr
				USED	DOSE	USED	DOSE	USED	DOSE			sq ft
		%	10^3 lb	10 lb	%	10 lb	%	lb	ppm	% TS	% TS	
JAN	175	5.0	269							23	.33	7.9
FEB	156	5.0	226							22	.38	7.9
MAR	191	5.5	352							23	.35	9.1
APR	191	5.1	331							24	.34	8.6
MAY	158	5.5	289							25	.46	9.3
JUNE	205	6.5	416							26	.65	10.0
JULY	196	6.4	383							26	.67	9.4
AUG	164	6.6	365							26	.80	11.1
SEPT	183	6.0	350							26	.71	9.4
OCT	196	5.6	370							24	.67	9.3
NOV	194	5.6	376							24	.60	9.7
DEC	190	5.2	334							24	.41	8.7
TOTAL	2199	-	3661							-	-	-
AVERAGE	183	5.7	305							24	.53	9.2

Conditioning chemicals were not used in 1970.

Water management in Ontario